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BULLETIN

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MASB 15-89 3 March [illegible]

French SODAR's (Sound Detection and Ranging)

Background. REMTECH, a French firm, is one of the world's leading manufacturers of Doppler SODAR systems. These systems measure a vertical profile of wind speed, direction, thermal stratification and turbulence parameters from 40 meters to 1000 meters or more above the ground. SODAR systems are ideally suited for airport safety (wind shear detection), for pollution control and forecast, site surveys (powerplants) and the study of telecommunication network disturbances due to atmospheric conditions. Military applications also include programs for weapons development, parachuting, carrier landings and flight tests in general.

Operation. The three-dimensional monostatic Doppler SODAR system basically consists of three co-located antennas with high-power sound drivers. Two of the antennas, which are tilted 18 degrees from vertical and turned 90 degrees from each other, provide the horizontal information. The third antenna, pointed vertically, provides the vertical information. Each antenna is operated in a sequence and at a rate completely controlled by the software program of the system, which may be changed through keyboard input. The standard electronic complement of the system includes a power amplifier, a transceiver, hard-disk and floppy-disk recorders, a printer or CRT, and the terminal with keyboard – all controlled by a DEC PDP 11-53 microcomputer. All these system components, except the printer equipment, require an environmentally controlled operating location such as a building or trailer maintained at a temperature of 20°C ± 5°C. For permanent installations, the antennas and their integral enclosures would be mounted on concrete pads approximately 80 feet from the data acquisition equipment building. Where system mobility is a requirement, the antennas can be supplied mounted on a trailer.

New development. REMTECH has recently announced the availability of a completely new family of electronically steered beam phased array antenna SODAR's. These systems offer the following advantages:

- Only one antenna is needed, the steering of the beam being performed by phased control along the antenna elements.
- The power increase is significant, thus leading to increase in range compared to previous systems.
- No antenna enclosure is needed due to tapering of the amplitude; the antenna is a simple flat plate.

According to the manufacturer, a new 140-pound phased array antenna (measuring 4'5" x 4'5") shows a 30-percent increase in range compared to the standard REMTECH AO system whose three antennas weigh 90 pounds each. Technical specifications for this new family of SODAR's are given below.

TECHNICAL SPECIFICATIONS

MODEL	PA1	PA2	PA3	PA4	PA5	PA6
Number of elements	100	196	400	196	196	196
Type of elements	Motorola 1025	Motorola 1025	Motorola 1025	JBL 2445	JBL 2485 (modified)	Special JBL to be designed
Nominal operating frequency (hertz)	2400	1750	1750	480	160	90
Size (meters)	0.7 x 0.7	1.25 x 1.25	1.8 x 1.8	4.0 x 4.0	12.0 x 12.0	21.0 x 21.0
Weight (kg)	15	60	150	3000	3500	4000
Acoustic Power (W)	60	140	300	3500	3500	3500
Adaptative beamforming	no	no	no	no	no	yes
50 percent range (m) (basic software)	500	1000	1500	3000	10000	20000
Commercial availability	Available	Available	Available	Available	1989	1990